


PATENT COOPERATION TREATY 2011 15 12005

From the INTERNATIONAL SEARCHING AUTHORITY

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 Goudreau Gage Dubuc PROPRIÉTÉ INTELLECTUELLE	M.T. INSCRIPTION VALIDATION
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INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (date/month/year) 24 December 2004 (24-12-2004)

Applicant's or agent's file reference
ES/11229.219

FOR FURTHER ACTION
 See paragraph 2 below

International application n°
PCT/CA2004/001509

International filing date (date/month/year))
 16 August 2004 (16-08-2004)

Priority date (date/month/year)
 15 August 2003 (15-08-2003)

International Patent Classification (IPC) or both national classification and IPC

IPC⁶ C07D 209/86, C08F 26/12

Applicant **UNIVERSITE DE LAVAL**

1. This opinion contains indications relating to the following items :

- | | | |
|-------------------------------------|--------------|--|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the opinion |
| <input type="checkbox"/> | Box No. II | Priority |
| <input checked="" type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input checked="" type="checkbox"/> | Box No. VI | Certain documents cited |
| <input checked="" type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/CA
Commissioner of Patents
Canadian Patent Office
Box PCT, Ottawa/Gatineau K1A 0C9

Authorized officer

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Form PCT/ISA/237 (cover sheet) (January 2004)

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/CA2004/001509

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of :

- ☐ the entire international application
☒ claims Nos. 44 (in part) and 100 (in part)

because

- ☐ the said international application, or the said claims Nos. ____ relate to the following subject matter which does not require an international preliminary examination (*specify*) :

- ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 44 and 100 are so unclear that no meaningful opinion could be formed (*specify*) :

Due to the lack of support and the broadness of claims 44 and 100, the search of claims 44 and 100 was limited to polymerization products of 2-functionalized and 2,7-difunctionalized carbazole derivatives and to the examples given in figures 1 to 4.

- ☒ the claims, or said claims Nos. 44 and 100 are so inadequately supported by the description that no meaningful opinion could be formed.

- ☐ no international search report has been established for said claims Nos. ____

- ☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that :

- | | |
|----------------------------|--|
| the written form | <input type="checkbox"/> has not been furnished |
| | <input type="checkbox"/> does not comply with the standard |
| the computer readable form | <input type="checkbox"/> has not been furnished |
| | <input type="checkbox"/> does not comply with the standard |

- ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.

- ☐ See Supplemental Box for further details.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/CA2004/001509

Box No. V reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	5-27, 29-43, 45-99, 101-139	YES
	Claims	1-4, 28, 44 and 100	NO
Inventive step (IS)	Claims		YES
	Claims	1-139	NO
Industrial applicability (IA)	Claims	1-139	YES
	Claims		NO

2. Citations and explanations :

Reference is made to the following documents:

- ✓ D1: WO 03/022816 A1 (EQUISTAR CHEMICALS, LP) 20 March 2003, page 2, lines 11-28.
- ✓ D2: US 5902884 (CLARIANT GMBH) 11 May 1999, column 2, lines 16-52 and examples 1 to 8.
- ✓ D3: CA 2196046 (SANKYO COMPANY) 08 February 1996, pages 5 to 9.
- ✓ D4: CA 1026348 (HOFFMAN-LA ROCHE LIMITED) 14 February 1978, page 2.
- ✓ D5: Limburg, W.W.; Yanus, J.F.; Williams, D.J.; Goedde, A.O.; Pearson, J.M. Anionic Polymerization of N-Ethyl-2-Vinylcarbazole and N-Ethyl-3-Vinylcarbazole. *Journal of Polymer Science, Polymer Chemistry Edition*, 1975, 13(5), 1133-9, whole document.
- ✓ D6: Ambrose, J.F.; Nelson, R.F. Anodic Oxidation Pathways of Carbazoles. *J. Electrochem. Soc.*, 1968, 115, 1159-1164, whole document.
- ✓ D7: Registry Number 86-74-8 CAPLUS (9H-Carbazole)
- ✓ D8: Registry Number 1484-12-4 CAPLUS (9-Methyl-Carbazole)
- ✓ D9: Registry Number 86-28-2 CAPLUS (9-Ethyl-Carbazole)
- ✓ D10: Registry Number 1484-08-8 CAPLUS (9-Butyl-Carbazole)
- ✓ D11: Registry Number 1150-62-5 CAPLUS (9-Phenyl-Carbazole)
- ✓ D12: Registry Number 56166-62-2 CAPLUS (9-Ethyl-Carbazaldehyde)
- ✓ D13: Registry Number 3110-89-1 CAPLUS (9-Methyl-2,7-dicarbazaldehyde)
- ✓ D14: CA 2360826 (UNIVERSITÉ LAVAL) 30 April 2002, page 2, lines 15-24.
- ✓ D15: Liu, B.; Yu, W.-L.; Pei, J.; Liu, S.-Y.; Lai, Y.-H.; Huang, W. Design and Synthesis of Bipyridyl-Containing Conjugated Polymers: Effects of Polymer Rigidity on Metal Ion Sensing. *Macromolecules*, 2001, 34(23), 7932-7940, whole document.
- ✓ D16: Goldoni, F.; Janssen, A.J.; Meijer, E.W. Synthesis and Characterization of New Copolymers of Thiphen and Vinylene: Poly(thienylenevinylene)s and Poly(terthienylenevinylene)s with Thioether Side Chains. *J. Polym. Sci. Part A*, 1999, 37, 4629-4639, whole document.

✓ The subject matter of claims 1 to 4, 28, 44 and 100 does not fulfil the requirements of Article 33(2) PCT.

✓ D1 to D6 disclose carbazole derivatives which are encompassed by the subject matter of claim 1. For example, D1 discloses carbazole derivatives substituted in the 2 and/or 7 position wherein the substituents are selected from alkyl and alkenyl. D2 discloses carbazole and N-alkyl carbazole derivatives which are optionally substituted in the 2 position with alkyl. D3 discloses carbazole derivatives substituted in the 2 and/or 7 position wherein the substituents are selected from alkyl, chloromethyl or hydroxy methyl. D4 discloses N-alkyl and N-aryl carbazole derivatives substituted in the 2 and 7 positions. D5 discloses N-ethyl carbazole derivatives substituted at the 2 position by formyl or vinyl and D6 discloses carbazole. All these compounds are encompassed by the scope of claim 1 and therefore claim 1 includes subject matter which is not new.

✓ Furthermore, certain compounds of claims 1 to 4 and 28 are already known and specifically disclosed in D7 to D13.

✓ D5 discloses the polymerization of N-ethyl-2-vinylcarbazole which polymerization is encompassed by claims 44 and 100.

✓ The subject matter of claims 1 to 139 does not fulfil the requirements of Article 33(3) PCT.

✓ From D14, conjugated polycarbazole derivatives are known to be important electroactive and photoactive materials. The problem to be solved by the present application is considered to be the provision of further conjugated polycarbazoles. From D15 and D16, it is known that the introduction of vinylene units into the polymeric backbone of conjugated polymers will increase the effective conjugation length and lead to a spectral shift. Accordingly, it would be obvious for the skilled person to introduce vinylene units in the already known polycarbazole derivatives and to use the monomers of claims 1 to 43 as starting materials to obtain the desired polymers. An inventive step cannot be acknowledged for these claims.

✓ The claimed subject matter of claims 1-139 is considered to be industrially applicable and thus fulfilling the requirements of Article 33(4) PCT.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/CA2004/001509

Box No. VI Certain documents cited

1. Certain published documents (Rules 43bis.1 and 70.10)

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
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WO 2004/070772 A2 (E)	19/08/2004	04/02/2003	06/02/2003
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2. Non-written disclosures (Rule 43bis.1 and 70.9)

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)
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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/CA2004/001509

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted :

- ✓ The last two compounds found on page 3 of the description are repeated at the beginning of page 4.
- ✓ On page 16, line 16, of the description the expression "could be" causes a lack of clarity. This expression should be "could not be".

WRITTEN OPINION OF THE
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International application No.
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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made :

✓ This application does not meet the requirement of Article 6 for the following reasons:

✓ The scope of claims 1 to 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44 to 46, 49, 50, 53 to 55, 58, 59, 62, 64, 65, 67, 68, 70, 71, 73 to 75, 77, 78, 80 to 82, 84, 86, 87, 90, 93 to 94, 96, 97, 99 to 102, 105 to 107, 110 to 112, 115 to 117, 120 to 122, 125 to 127 and 130 to 132 is not clear because of the terms "alkyl" and "aryl" which are non-limitative.

✓ There is no support in the description for the scope of claims 1, 44 and 100. According to the description (paragraphs [0009], [0013] and [0027]), the invention relates to 2-functionalized and 2,7-difunctionalized carbazoles and to 2,7-carbazolenevinylene oligomers and polymers. However, claim 1 includes compounds wherein there is no functional groups on either positions 2 or 7 of the carbazole ring and claims 44 and 100 include oligomers and polymers wherein no vinylene units are found in the oligomeric and polymeric backbones.

✓ In claim 1, the term "acetonitrile" causes a lack of clarity. Since reference is being made to a radical and not a compound, this term should read "cyanomethyl".

Claims 44 and 100 lack clarity because these claims attempt to define the invention by the result to be obtained. Since different oligomers or polymers can be obtained depending on the starting materials and the reaction conditions used, it is unclear which oligomers or polymers are actually being claimed.

✓ It is not clear what type of composition or electronic device is being claimed in claims 135 and 136.

✓ Claims 6, 7, 20 and 21 do not meet the requirement of Rule 6.4(b) because these claims do not include all the limitations of the claims to which they refer. Claims 6, 7, 20 and 21 define R¹ as being aryl. However, claims 4 and 18 define R¹ as being alkyl.

✓ A statement in an application, such as found on page 2 which incorporates by reference any other document, does not comply with Article 5 PCT.

✓ The general statement in the description at page 37 implies that the extent of protection may be expanded in some vague and not precisely defined way, and when used to interpret the claims renders them also unclear, contrary to Article 6 PCT.